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New Study Shows that the Same Gene Speaks Differently Depending on the Environment

A recently released paper in the Proceedings of the National Academy of Sciences (PNAS), "The Role of Mother's Genes and Environment in Postpartum Depression," explores the interplay between genes and environment when determining whether a mother is at high or low risk for post-partum depression.

As part of the continuing [Fragile Families and Child Wellbeing Study](#), launched in 1997, researchers examined the DNA of more than 1,200 mothers. The authors specifically examined two genetic markers— 5-HTTLPR and Stin2 —that have been linked to risk of depression. These data were then examined against whether or not the mother was depressed in the first year of her child's life and her level of education – with low levels of education being a proxy for a negative environment and higher levels for a positive one.

The Findings

While post-partum depression affected less than a quarter (17%) of those sampled, the rates varied depending on whether the mother carried specific variants of a gene associated with biological sensitivity to her environment and her level of education.

- Not surprisingly, mothers with genetic markers that made them more sensitive to their environment were more likely than other new mothers to become depressed if they were in a negative environment (i.e. low level of education).
- Mothers without these markers looked the same across the education spectrum, with rates of depression the same regardless of environment. For these mothers, environment did not seem to have much of an impact.
- However, when a mother with the 'sensitive' markers was in a positive environment (i.e. high level of education) she was actually *less* likely to become depressed than all other mothers, including those without the environmentally sensitive genetic markers.
- Thus, the term "depression gene" is not quite right. In fact, the genetic markers previously linked with depression are actually signaling a more environmentally sensitive genetic makeup. This results in mothers with the sensitive genetic make-up actually being better off than other mothers in a positive environment, but worse off than others in harsher environments.

"The specific findings of this study are very interesting," said Colter Mitchell, lead author of the paper. "But the paper is important because of the bigger concept it demonstrates. That is, certain genes may have a positive or negative effect depending on a person's environment."

The paper was a collaborative effort by Colter Mitchell, Center for Research on Child Wellbeing and Office of Population Research, Princeton University; Daniel Notterman, Princeton University and Penn State College of Medicine; Jeanne Brooks-Gunn, Teachers College and the College of Physicians and Surgeons, Columbia University; Iulia Kotenko, Department of Molecular Biology, Princeton University; Kate Jaeger, Center for Research on Child Wellbeing and Office of Population Research, Princeton University; John Hobcraft, Department of Social Policy and Social Work, University of York; Irwin Garfinkel, School of Social Work, Columbia University; and Sara McLanahan, Center for Research on Child Wellbeing and Office of Population Research, Princeton University.



For a full copy of the paper, please contact Elisabeth Donahue at (609) 258-5988 or edonahue@princeton.edu or Jesse Jacobs at (609) 258-0157 or jj7@princeton.edu. A summary is attached.

For additional information about the study, please contact Colter Mitchell at (609) 258-2772 or cmitchel@princeton.edu.

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